

Art Museum Database

Final Project Report



Artfolio

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08/05/2024

DATABASE FINAL PROJECT REPORT

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Problem Description

We simulated a situation where a newly established art museum maintains records of its art pieces in a simple binder. In order to improve data management and accessibility, we transformed the museum's record information into a digital database. This migration streamlines data storage, improves searchability, and facilitates more efficient record-keeping for the museum's painting collection. Overall, this project needs to perform the same actions that a regular art museum would be able to perform. These actions include CRUD operations for multiple entities such as the art pieces themselves, their creators, the users of the museum application, and transactions that are made by the users.

Contributions

Adam Burhanpurwala

- CRUD for Creators
- Documentation setup and submission in MS Teams
- Developed templated table and form layout for the application
- Jinja Templating for HTML files
- Created base function for mapping names to IDs
- User journey development and enhanced UX
- Logo development

Blake Dejohn

- Team Leader
- CRUD for Art Pieces
- Set up Python Virtual Environment
- Wrote majority of README
- Made a PostgreSQL database in the cloud that the entire team could use
- Styled the application
- Created the start of the application with its corresponding HTML files (used later to make the templates)
- Presentation video editing

Jaden Wang

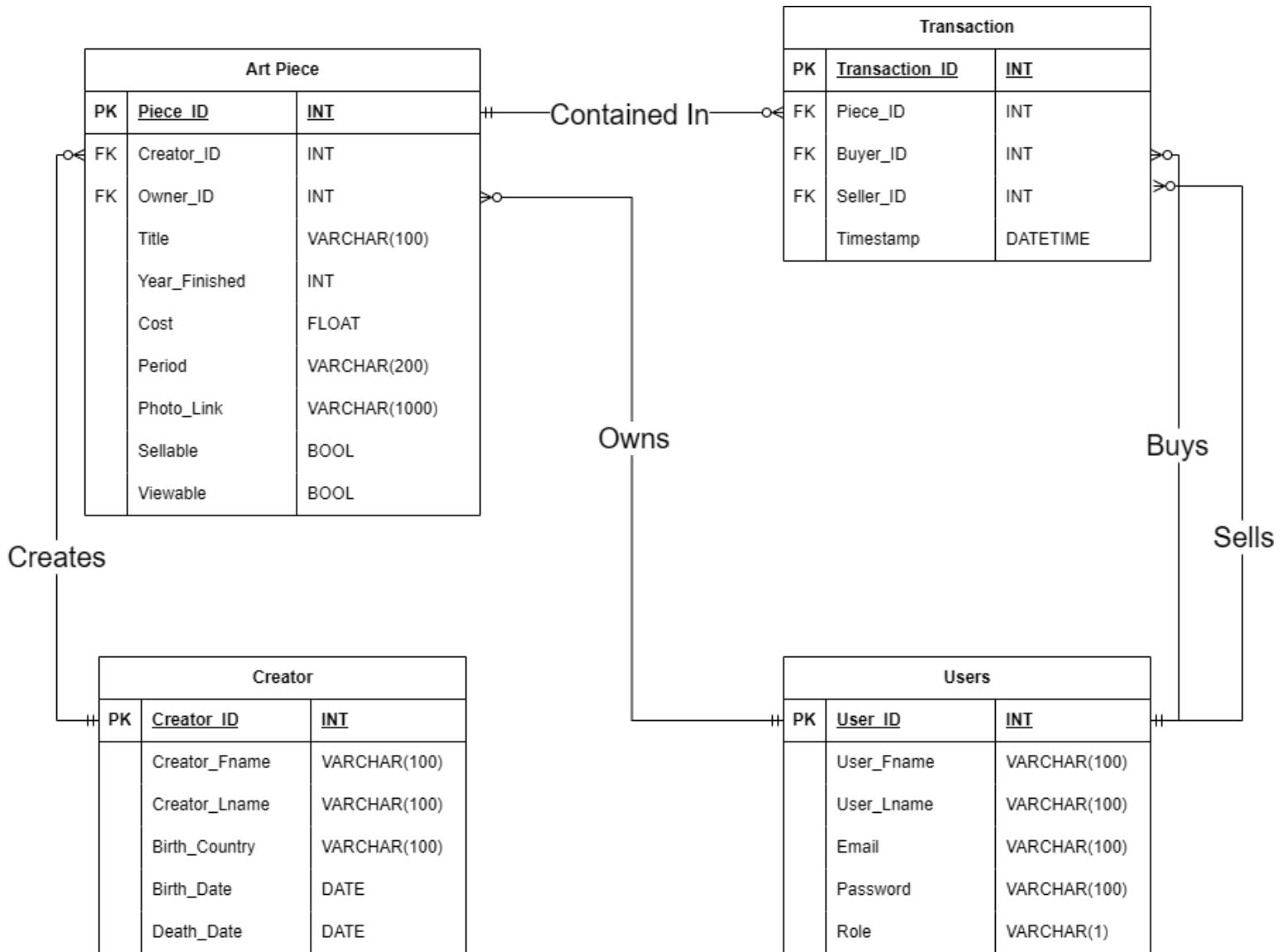
- CRUD for Transactions
- Class instantiation
- Branch-to-main compiler
- Relational Schemes creator
- UI-uniformity assistant
- Assignment submission assistant
- Repository creation assistant

Kyle Easton

- CRUD for Users
- Deployed application to cloud
- Integration of separate code segments from each git branch
- Allowed session to know if logged in user is patron or admin
- Created separate views for patrons

Database Design

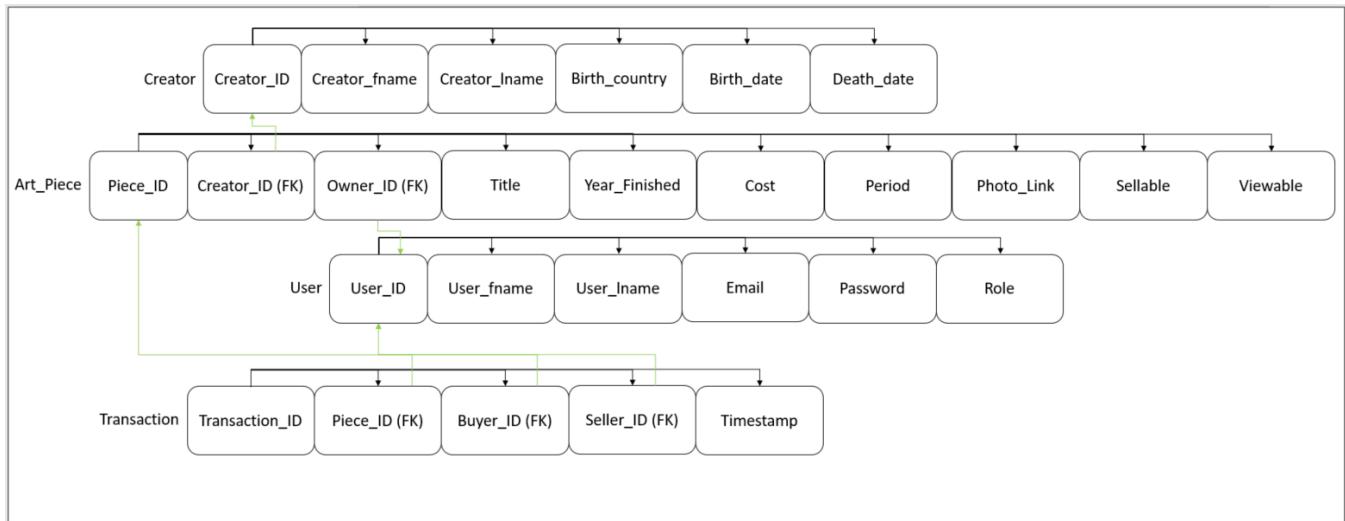
Entity Relationship Diagram



Entities and Attributes

- Primary keys are bolded
- Foreign Keys are italicized
- Creator
 - **Creator_ID**
 - Creator_fname
 - Creator_lname
 - Birth_country
 - Birth_date
 - Death_date
- Art Piece
 - **Piece_ID**
 - *Creator_ID*
 - *Owner_ID (User_ID)*
 - Title
 - Year_finished
 - Cost
 - Period
 - Photo_Link
 - Sellable
 - Viewable
- User
 - **User_ID**
 - User_fname
 - User_lname
 - Email
 - Password
 - Role
- Transaction
 - **Transaction_ID**
 - *Piece_ID*
 - *Buyer_ID (User_ID)*
 - *Seller_ID (User_ID)*
 - Timestamp

Relations



Current Constraints:

- All IDs are used as primary keys
 - Primary keys are never NULL
 - As a result, every foreign key that points to a primary key from another table will always point to non-NULL values
- All IDs are of type SERIAL
- For information we do not know (e.g unknown creator, some attribute about a painting is not known like the year it was finished, etc.) we will use "Unknown" as a placeholder. This will be used in place of NULL
 - One exception would be the unknown creator would still have a populated Creator_ID. The attributes of the entity referenced to by Creator_ID will be populated as "Unknown"
- All text-based attributes will be of type VARCHAR of length 100
- Timestamp format: YYYY-MM-DD
- A user role can only take the values: Admin and Patron
 - Only certain roles can do specific actions in our application:
 - An admin has complete control of the application, with access to all CRUD functionalities of each entity.
 - A patron can view art pieces that are viewable, buy certain pieces up for sale/are sellable, and sell their own pieces if they have ownership over them.
 - A patron can create art pieces and update/delete art pieces they own (have bought)
 - Patrons can only create and update within the creator entity
 - A patron can initiate (create) a transaction, view their transactions history and only delete their transactions.
 - A patron can only create a patron user, read themselves, update their own details and delete their own account
- The sellable and viewable attributes in the art piece entity are of type Boolean.
- Certain entities can not be deleted if they are referred to in another table (to keep referential integrity)
 - Examples of this include:

- An art piece can not be deleted if it is in a transaction
- A creator can not be deleted if they have art pieces associated with them
- A user can not be deleted if they own paintings or are a part of one or more transactions

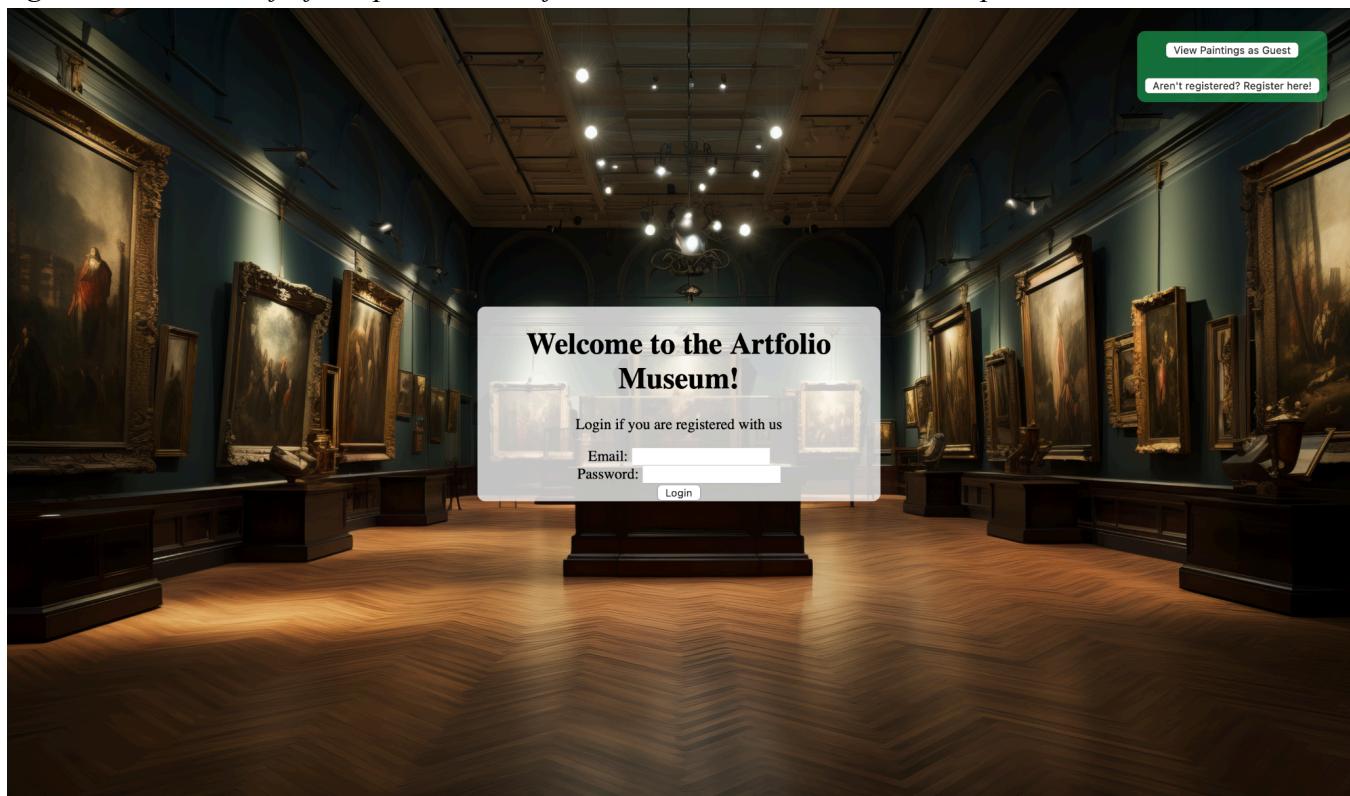
Normalizations

The database schema was normalized to Boyce-Codd Normal Form (BCNF) to ensure minimal redundancy and optimal integrity. The 'Creator', 'Art Piece', and 'User' tables contain only atomic attributes and are fully functionally dependent on their respective primary keys, meeting 1NF, 2NF, and 3NF. The 'Transaction' table initially had partial dependencies with 'Piece_Title' and 'Piece_Cost', which were removed to achieve BCNF by making these attributes accessible through 'Piece_ID'. This normalization eliminates redundancy and maintains data integrity across the schema, ensuring efficient and consistent data management.

User Interface

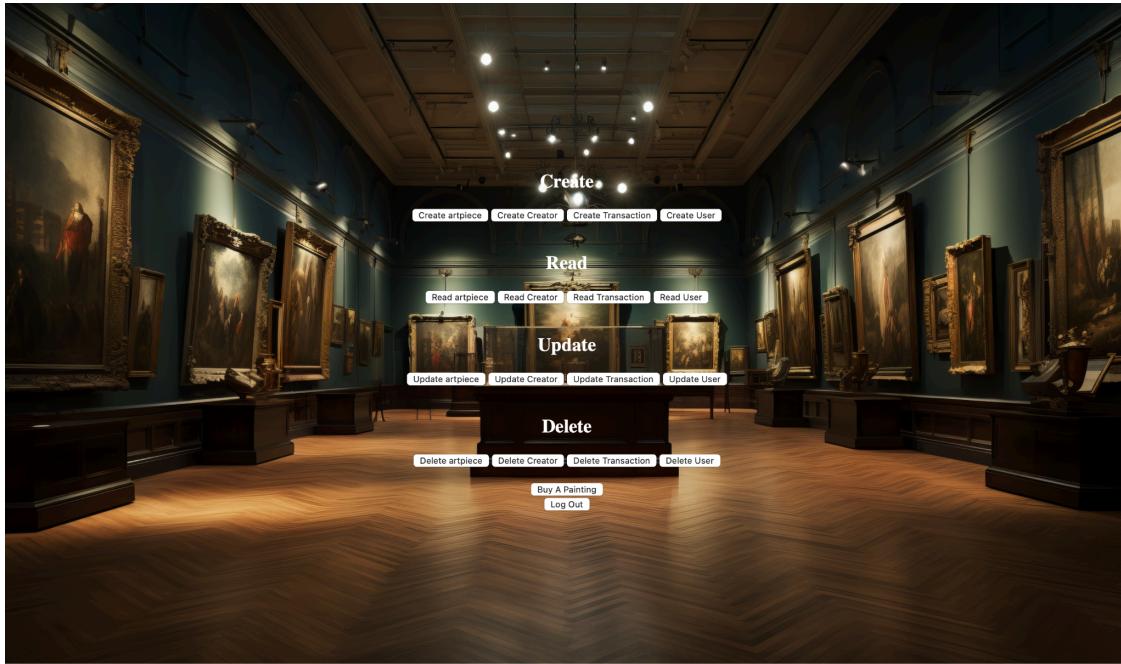
- Login Page

Users have the option to log in if they are registered members, allowing them access to additional features. New users can sign up to gain full access, while guests can still view the paintings without logging in. This tiered access approach ensures that all visitors can engage with the content, while registered users benefit from personalized features and a more interactive experience.



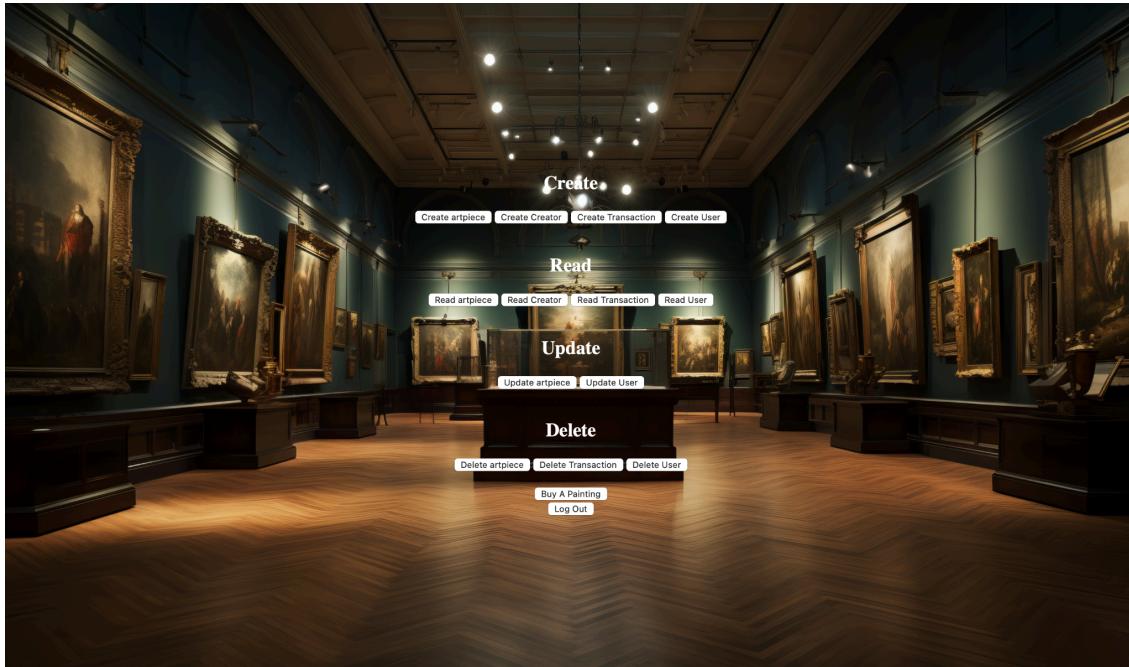
- Admin Page

Admins have complete access to all CRUD functionalities for all entities and their associated data. This comprehensive access allows admins to fully manage the system, ensuring data integrity and efficient operation across all aspects of the database.



- Patron view

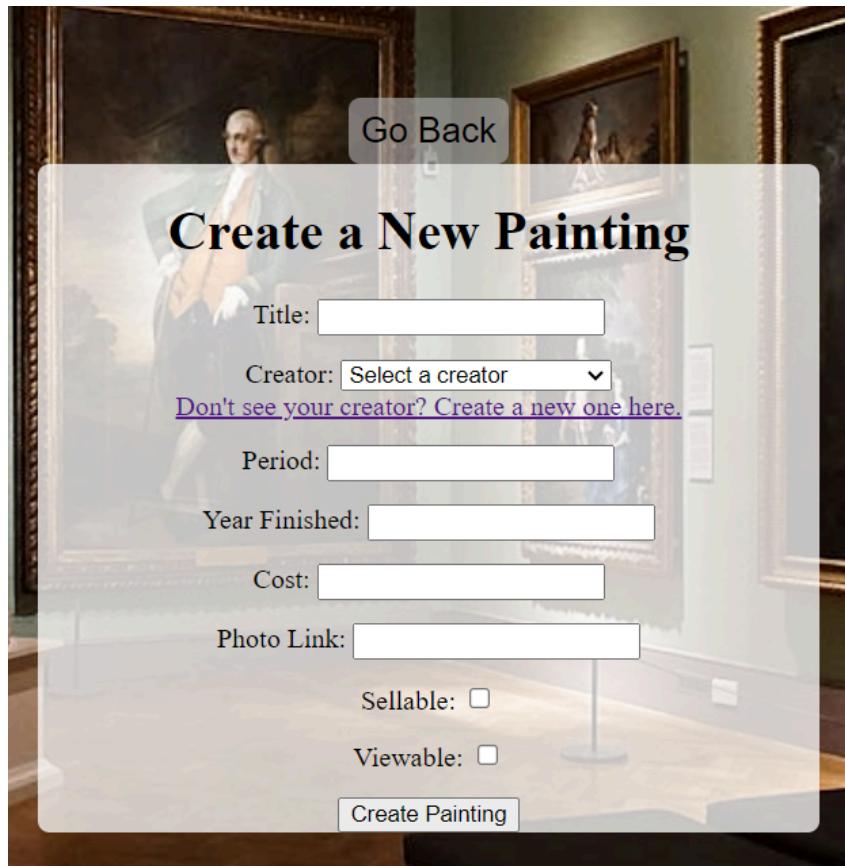
Patrons do not have full access to all CRUD functionalities.



Art Piece CRUD

- Create Art Piece

Creating an art piece allows you to enter the title, creator, period, year finished, cost, photo, and whether the piece is sellable or viewable. If you do not see the creator of your piece, you may click the link to first create your creator, then add in your piece. If valid input is given, you will see a green confirmation message.

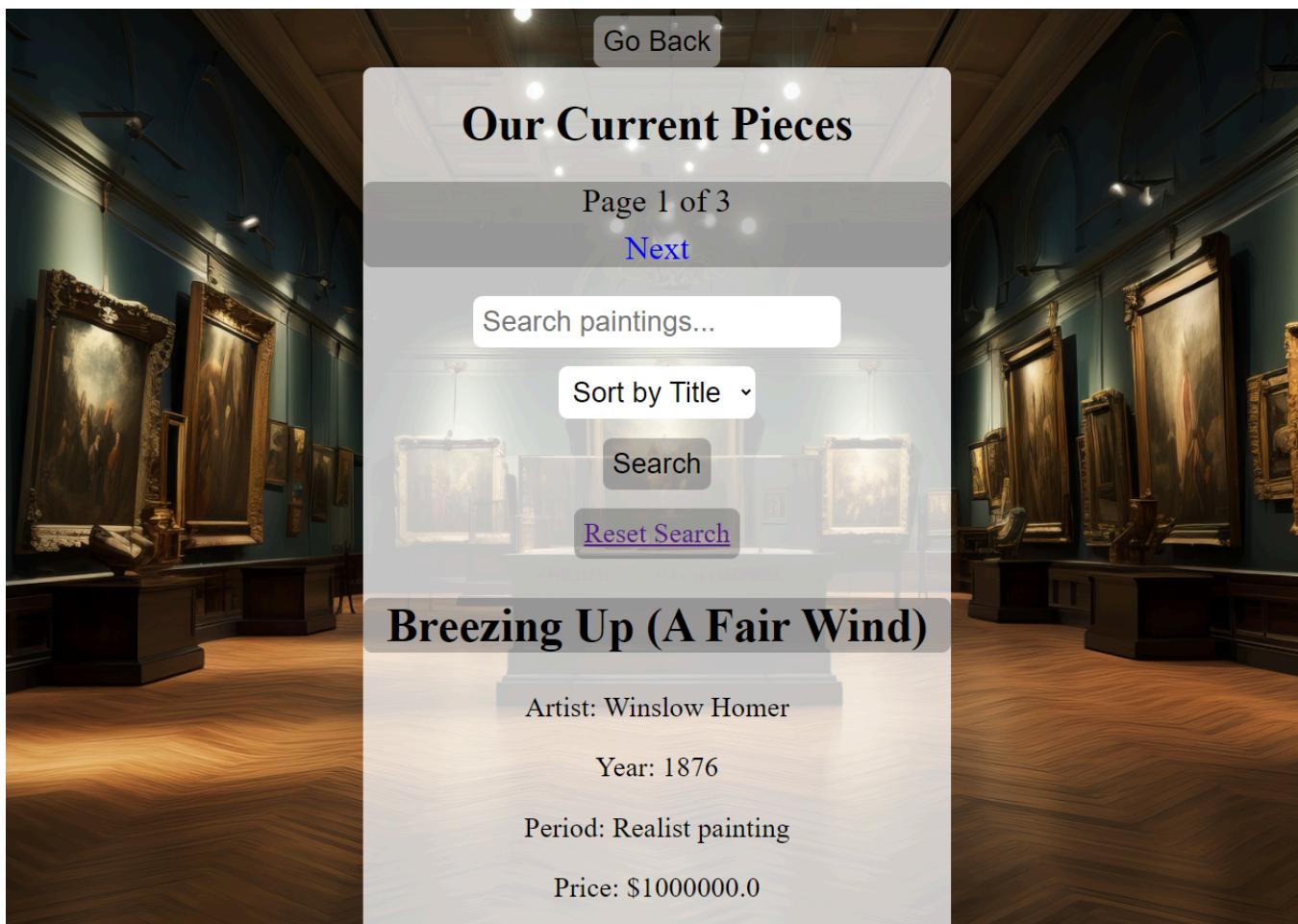


A screenshot of a web application interface titled "Create a New Painting". The background shows a gallery with several framed oil paintings. A "Go Back" button is located in the top left corner of the form area. The form itself has a light gray background and contains the following fields:

- Title:
- Creator:
- Don't see your creator? Create a new one here.
- Period:
- Year Finished:
- Cost:
- Photo Link:
- Sellable:
- Viewable:
-

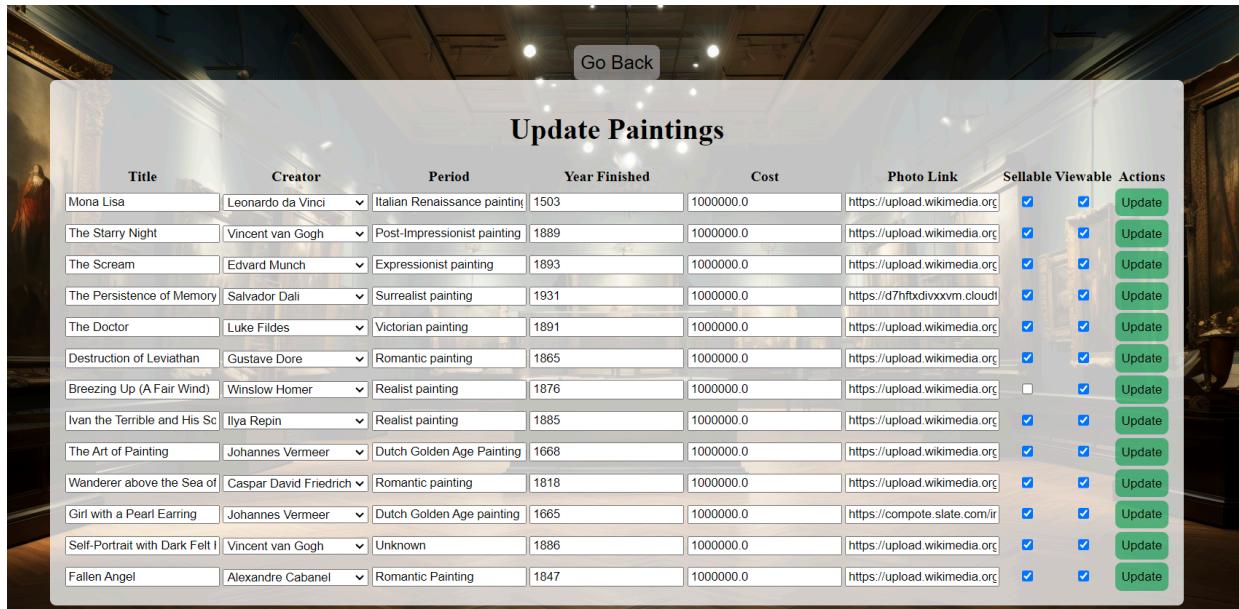
- *Read Art Piece*

You will see all art pieces in the gallery, including the artist name, year, price, title, and the photo. You have the option to sort by title or date, as well as a search function to find a piece by title.



- *Update Art Piece*

Each row represents a painting, if you find the piece you would like to change, you can enter in the updated info then press the green update button. If successful, you will see a green message. Admins can update all paintings information, while patrons can only update paintings they own.

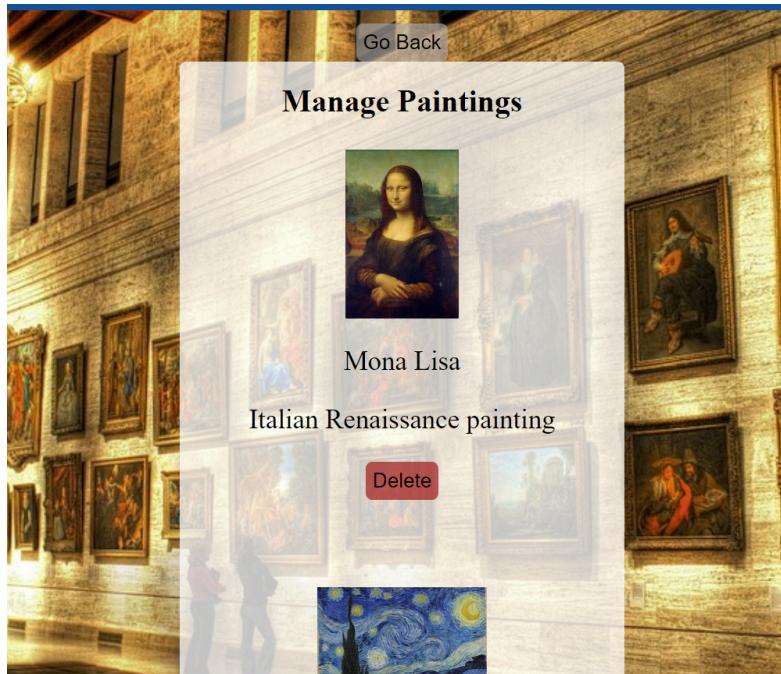


The screenshot shows a table titled "Update Paintings" with a "Go Back" button at the top left. The table has columns for Title, Creator, Period, Year Finished, Cost, Photo Link, Sellable, Viewable, and Actions. Each row contains a set of input fields for updating painting details, followed by a green "Update" button. The "Actions" column contains a "Delete" button for each row.

Title	Creator	Period	Year Finished	Cost	Photo Link	Sellable	Viewable	Actions
Mona Lisa	Leonardo da Vinci	Italian Renaissance painting	1503	1000000.0	https://upload.wikimedia.org	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>
The Starry Night	Vincent van Gogh	Post-Impressionist painting	1889	1000000.0	https://upload.wikimedia.org	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>
The Scream	Edvard Munch	Expressionist painting	1893	1000000.0	https://upload.wikimedia.org	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>
The Persistence of Memory	Salvador Dali	Surrealist painting	1931	1000000.0	https://d7htxdivxxvm.cloud	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>
The Doctor	Luke Fildes	Victorian painting	1891	1000000.0	https://upload.wikimedia.org	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>
Destruction of Leviathan	Gustave Doré	Romantic painting	1865	1000000.0	https://upload.wikimedia.org	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>
Breezing Up (A Fair Wind)	Winslow Homer	Realist painting	1876	1000000.0	https://upload.wikimedia.org	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>
Ivan the Terrible and His Son	Ilya Repin	Realist painting	1885	1000000.0	https://upload.wikimedia.org	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>
The Art of Painting	Johannes Vermeer	Dutch Golden Age Painting	1668	1000000.0	https://upload.wikimedia.org	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>
Wanderer above the Sea of	Caspar David Friedrich	Romantic painting	1818	1000000.0	https://upload.wikimedia.org	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>
Girl with a Pearl Earring	Johannes Vermeer	Dutch Golden Age painting	1665	1000000.0	https://compte.slate.com/ir	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>
Self-Portrait with Dark Felt I	Vincent van Gogh	Unknown	1886	1000000.0	https://upload.wikimedia.org	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>
Fallen Angel	Alexandre Cabanel	Romantic Painting	1847	1000000.0	https://upload.wikimedia.org	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<button>Update</button>

- *Delete Art Piece*

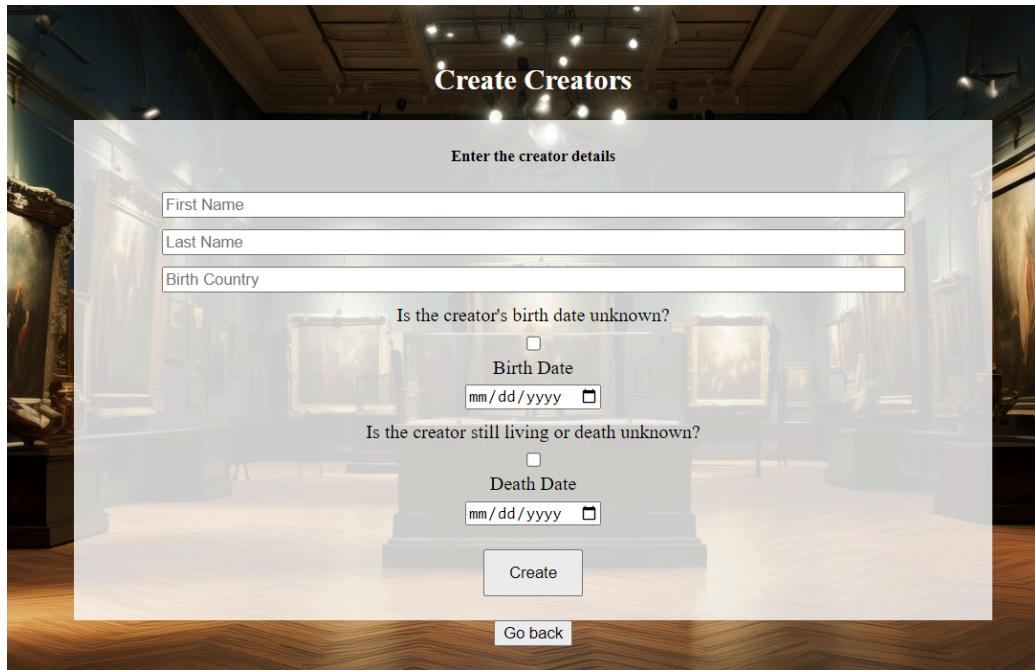
Deleting an art piece requires that it not be referenced in any transactions, if the art piece you choose to delete is deletable, you may press the red delete button below the piece you would like to delete and if successful, a green message will appear.



Creator CRUD

- Create Creator

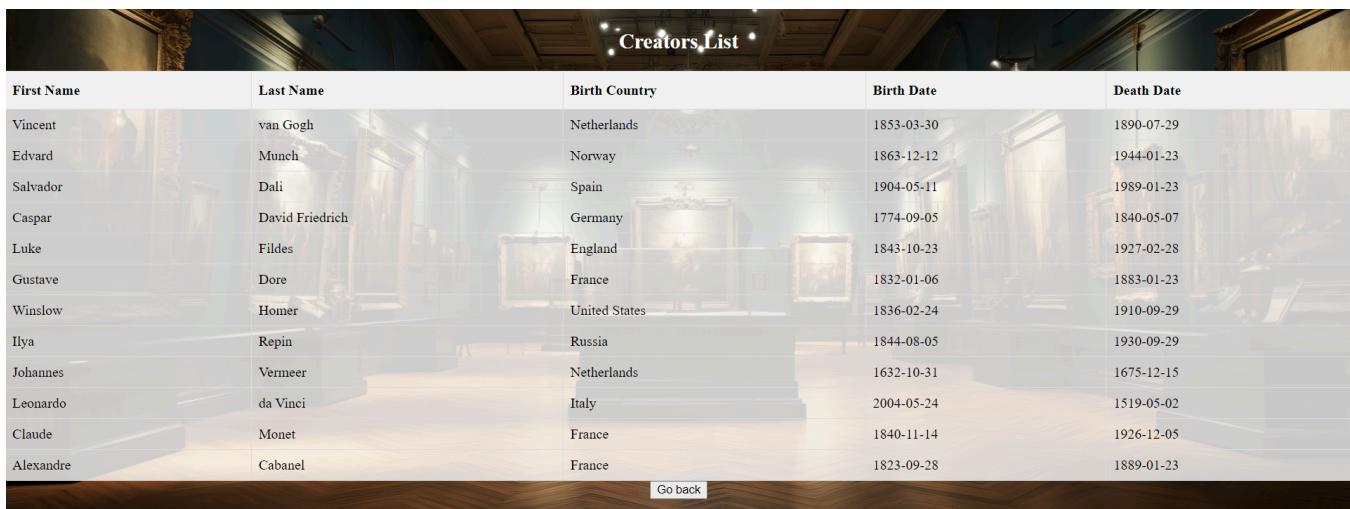
Creating a creator allows you to type the creators first name, last name, and birth country, as well as birth and death dates. If birth or death dates are unknown, or the creator is alive, there is an option to mark that it is unknown. If valid input is given, a green confirmation message will appear.



The screenshot shows a 'Create Creators' form overlaid on a background image of a museum gallery. The form title is 'Enter the creator details'. It contains three text input fields: 'First Name', 'Last Name', and 'Birth Country'. Below these are two sections with checkboxes: 'Is the creator's birth date unknown?' and 'Is the creator still living or death unknown?'. Each section has a 'Birth Date' field with a date input and a 'Death Date' field with a date input. A 'Create' button is at the bottom, and a 'Go back' button is at the bottom right.

- Read Creator

Information for first name, last name, birth country, birth date, and death date will appear for all creators in our database.

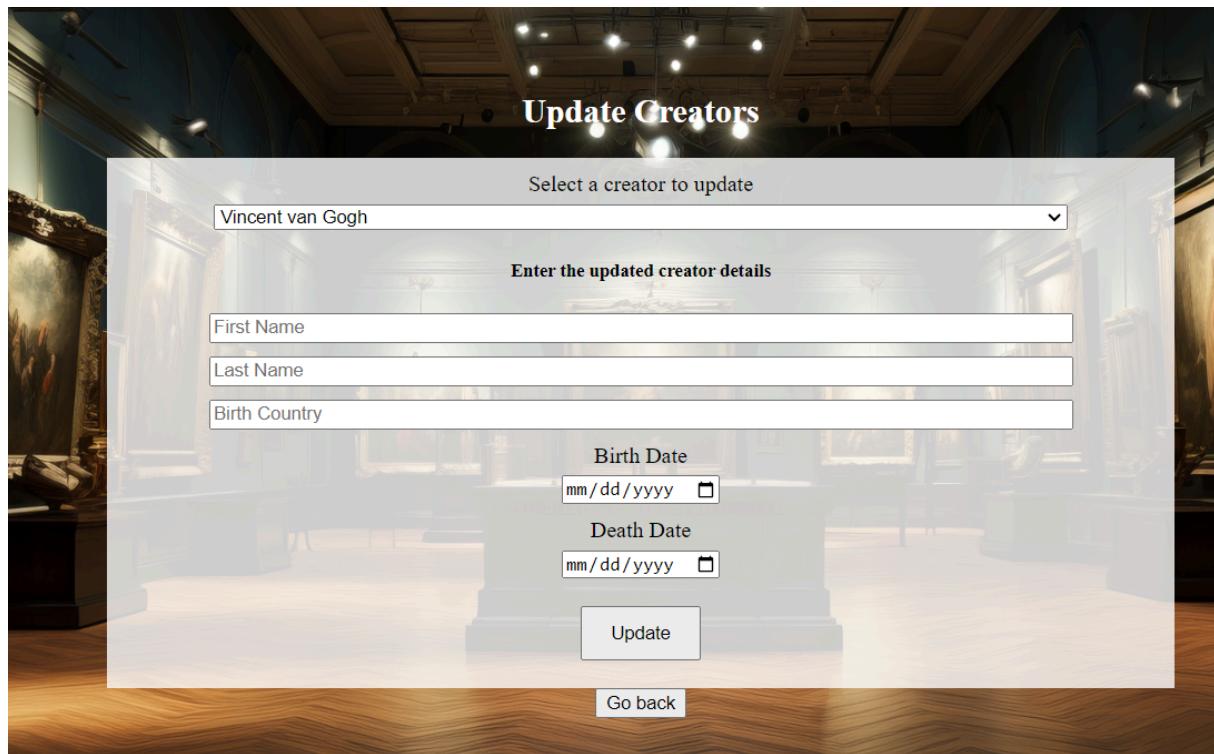


The screenshot shows a 'Creators List' page overlaid on a museum gallery background. The title 'Creators List' is at the top. A table lists 15 creators with columns for First Name, Last Name, Birth Country, Birth Date, and Death Date. At the bottom is a 'Go back' button.

First Name	Last Name	Birth Country	Birth Date	Death Date
Vincent	van Gogh	Netherlands	1853-03-30	1890-07-29
Edvard	Munch	Norway	1863-12-12	1944-01-23
Salvador	Dali	Spain	1904-05-11	1989-01-23
Caspar	David Friedrich	Germany	1774-09-05	1840-05-07
Luke	Fildes	England	1843-10-23	1927-02-28
Gustave	Dore	France	1832-01-06	1883-01-23
Winslow	Homer	United States	1836-02-24	1910-09-29
Ilya	Repin	Russia	1844-08-05	1930-09-29
Johannes	Vermeer	Netherlands	1632-10-31	1675-12-15
Leonardo	da Vinci	Italy	2004-05-24	1519-05-02
Claude	Monet	France	1840-11-14	1926-12-05
Alexandre	Cabanel	France	1823-09-28	1889-01-23

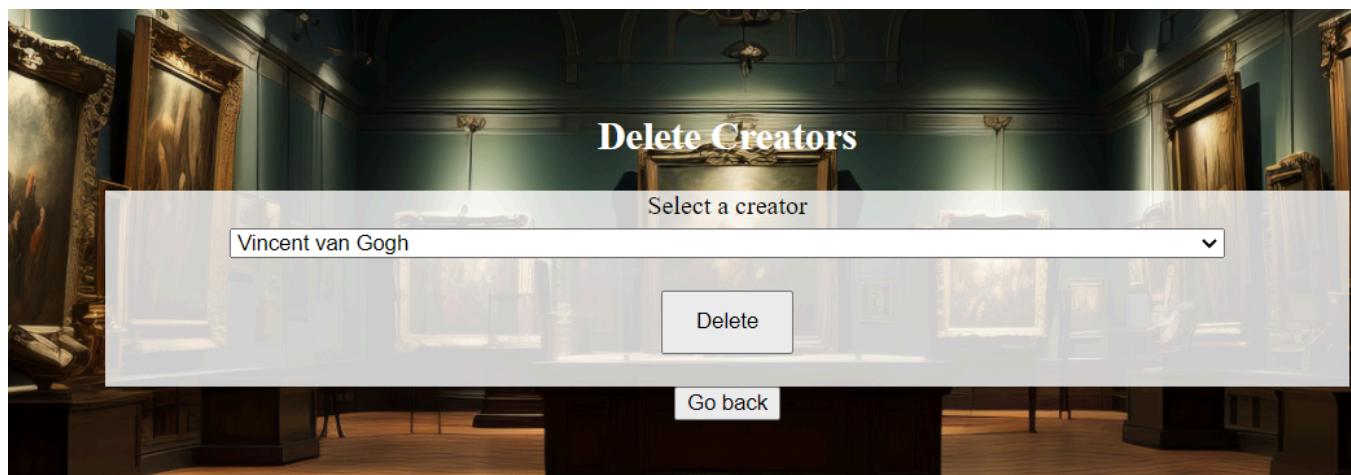
- *Update Creator*

Only admins can update creator details to maintain data integrity. Select the creator you want to update information for from the dropdown, then enter any new information about that creator and click update. If successful, a green message will appear.



- *Delete Creator*

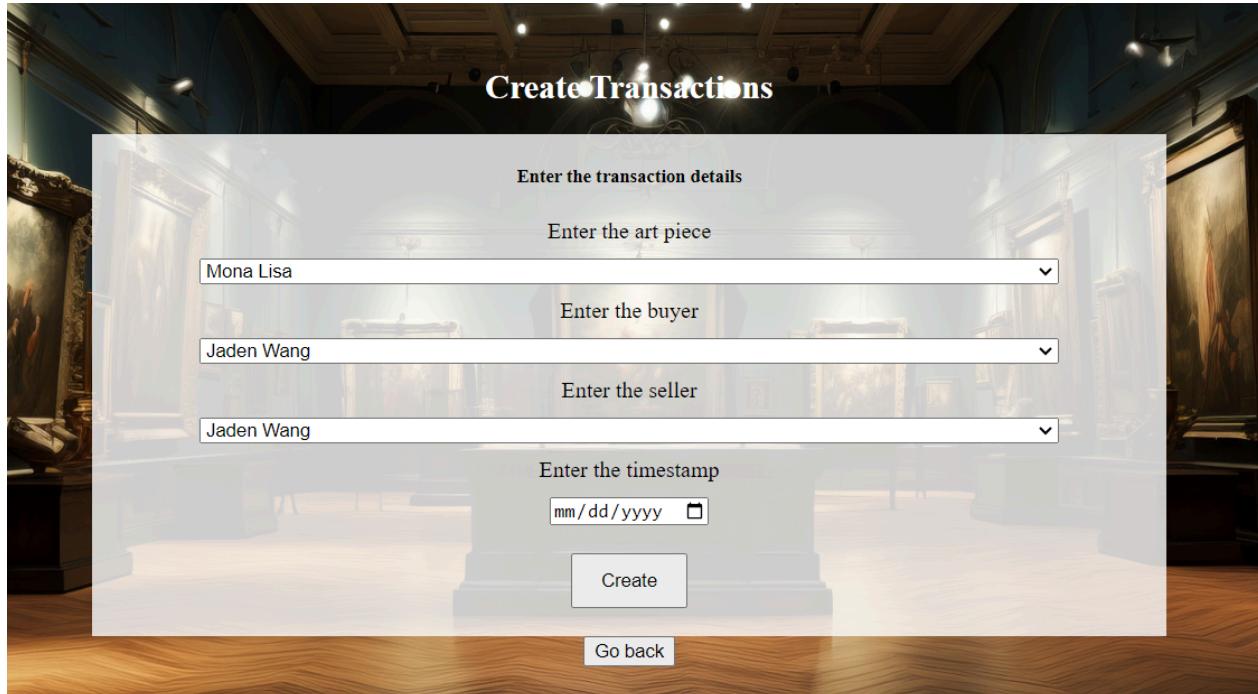
Deleting creators requires that the creator is not associated with any art piece in the database. Click the creator from the dropdown, then delete. If successful, a green message will appear. Only an admin can delete creators.



Transaction CRUD

- Create Transaction

Select an art piece, and two users to create the new transaction between from the dropdowns, then enter the date this occurred. The transaction will not validate unless the seller has possession of the piece selected in the database. If they do, you will see a green confirmation message and ownership will be transferred and a transaction will be created.



Create Transactions

Enter the transaction details

Enter the art piece

Mona Lisa

Enter the buyer

Jaden Wang

Enter the seller

Jaden Wang

Enter the timestamp

mm/dd/yyyy

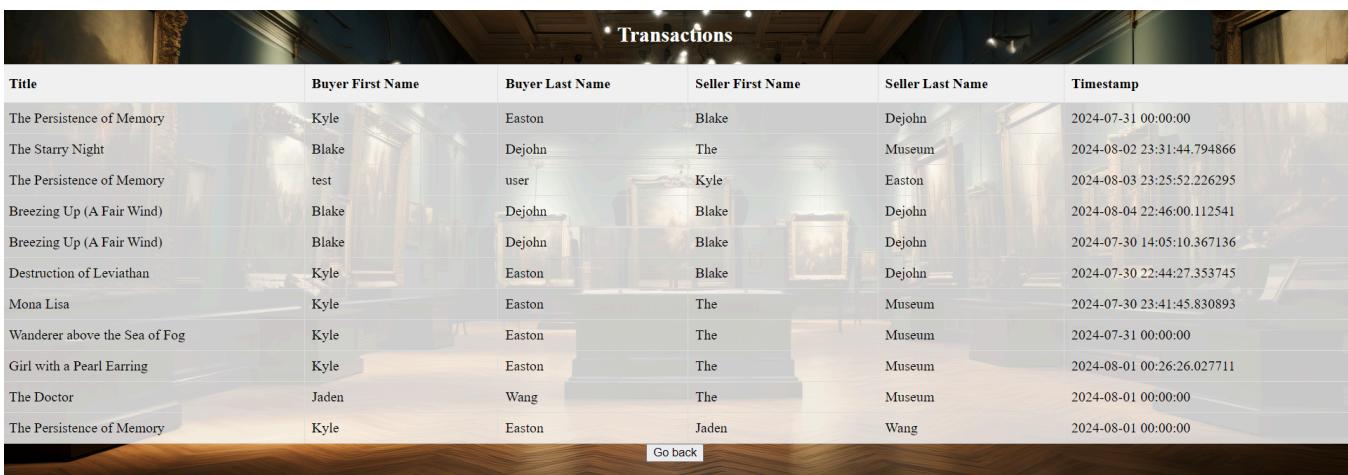
Create

Go back

This screenshot shows a 'Create Transactions' form overlaid on a background image of a museum gallery. The form includes fields for selecting an art piece ('Mona Lisa'), buyer ('Jaden Wang'), seller ('Jaden Wang'), and timestamp ('mm/dd/yyyy'). A 'Create' button is at the bottom, and a 'Go back' button is at the bottom right.

- Read Transaction

View the piece title, buyer name, seller name, and timestamp of all transactions in the database. Admins can view all transactions, while patrons can only view transactions they are part of.



Transactions

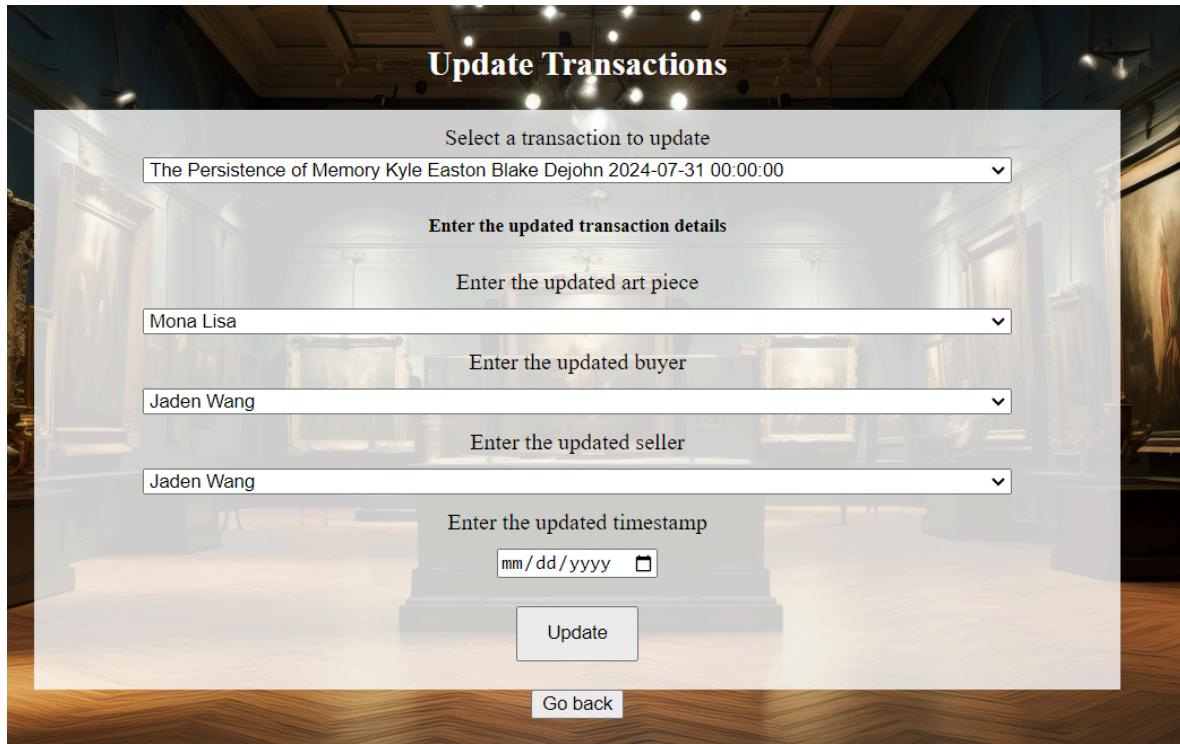
Title	Buyer First Name	Buyer Last Name	Seller First Name	Seller Last Name	Timestamp
The Persistence of Memory	Kyle	Easton	Blake	Dejohn	2024-07-31 00:00:00
The Starry Night	Blake	Dejohn	The	Museum	2024-08-02 23:31:44.794866
The Persistence of Memory	test	user	Kyle	Easton	2024-08-03 23:25:52.226295
Breezing Up (A Fair Wind)	Blake	Dejohn	Blake	Dejohn	2024-08-04 22:46:00.112541
Breezing Up (A Fair Wind)	Blake	Dejohn	Blake	Dejohn	2024-07-30 14:05:10.367136
Destruction of Leviathan	Kyle	Easton	Blake	Dejohn	2024-07-30 22:44:27.353745
Mona Lisa	Kyle	Easton	The	Museum	2024-07-30 23:41:45.830893
Wanderer above the Sea of Fog	Kyle	Easton	The	Museum	2024-07-31 00:00:00
Girl with a Pearl Earring	Kyle	Easton	The	Museum	2024-08-01 00:26:26.027711
The Doctor	Jaden	Wang	The	Museum	2024-08-01 00:00:00
The Persistence of Memory	Kyle	Easton	Jaden	Wang	2024-08-01 00:00:00

Go back

This screenshot shows a table titled 'Transactions' displaying a list of transactions. The columns are: Title, Buyer First Name, Buyer Last Name, Seller First Name, Seller Last Name, and Timestamp. The table lists various transactions involving pieces like 'The Persistence of Memory', 'Mona Lisa', and 'The Starry Night', with buyers like 'Jaden Wang' and sellers like 'Dejohn' and 'The Museum'. A 'Go back' button is at the bottom right.

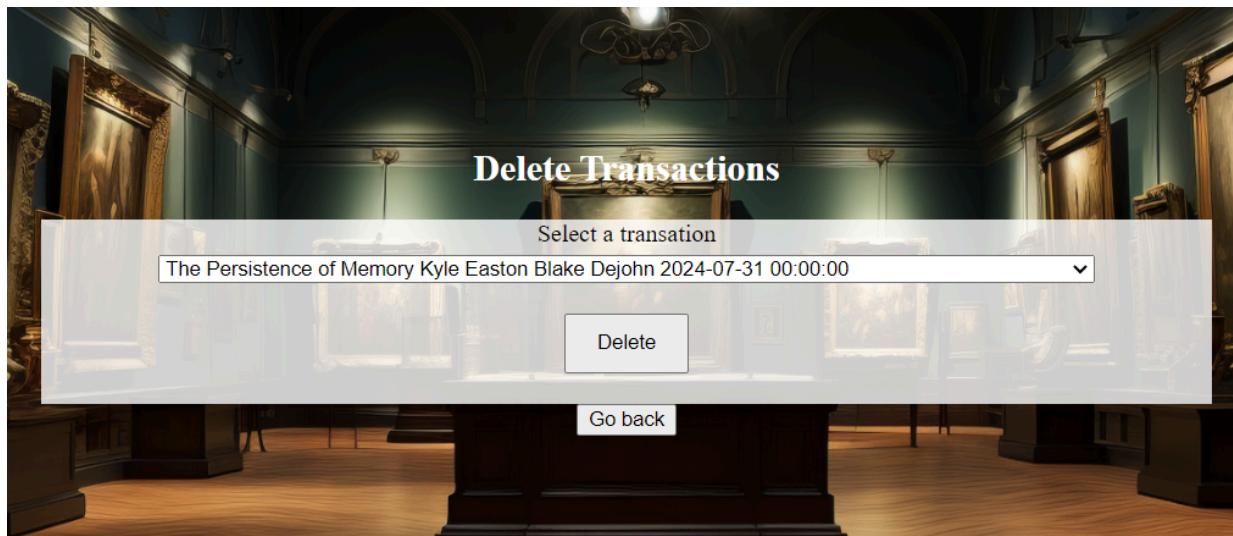
- *Update Transaction*

Only admins can update details for a transaction. From the dropdown, select which transaction you would like to update, then enter in the updated information and press update. If valid information has been input, a green confirmation message will appear.



- *Delete Transaction*

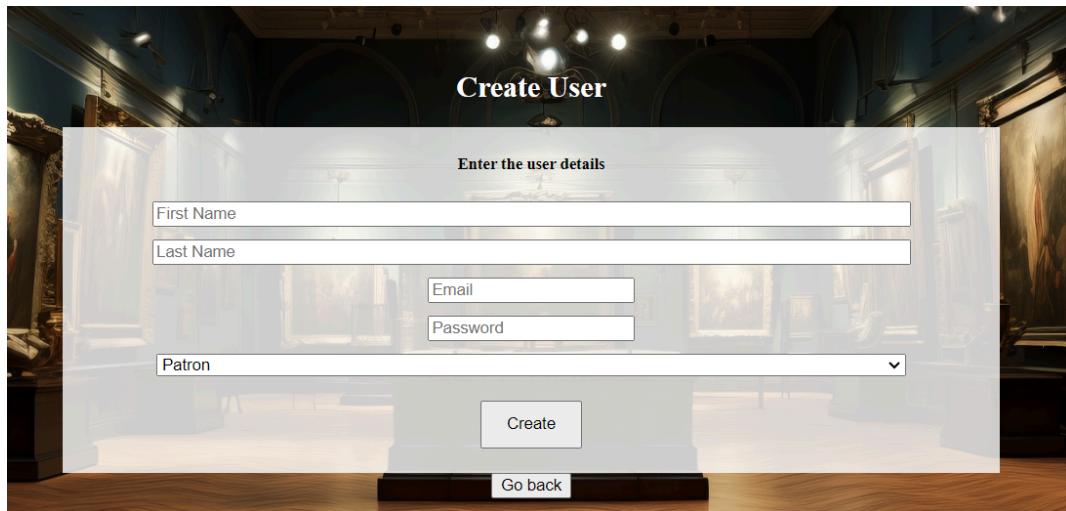
Select the transaction you would like to delete from the dropdown and press delete. If a valid transaction to delete has been selected, you will see a green confirmation message. Admins can delete all transactions, while patrons can only delete transactions they are part of.



Users CRUD

- Create User

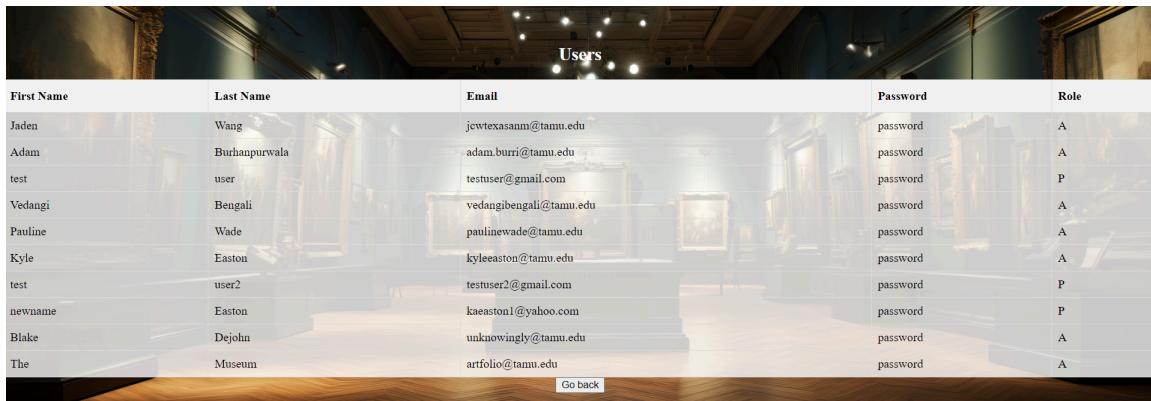
Creating a user ensures that all fields are populated and none are left null. Since email is a unique attribute, the email must not belong to an existing user in the database. Simply enter the information and click create user, if successful, a green message will appear.



The screenshot shows a 'Create User' form overlaid on a background image of a museum gallery. The form has a title 'Create User' at the top. Below it is a section titled 'Enter the user details' containing four input fields: 'First Name', 'Last Name', 'Email', and 'Password'. A dropdown menu labeled 'Patron' is also present. At the bottom of the form are two buttons: 'Create' and 'Go back'.

- Read User

Information for First Name, Last Name, email, password, and role will appear for all users in the database. Admins can view all users, while patrons can only view themselves.

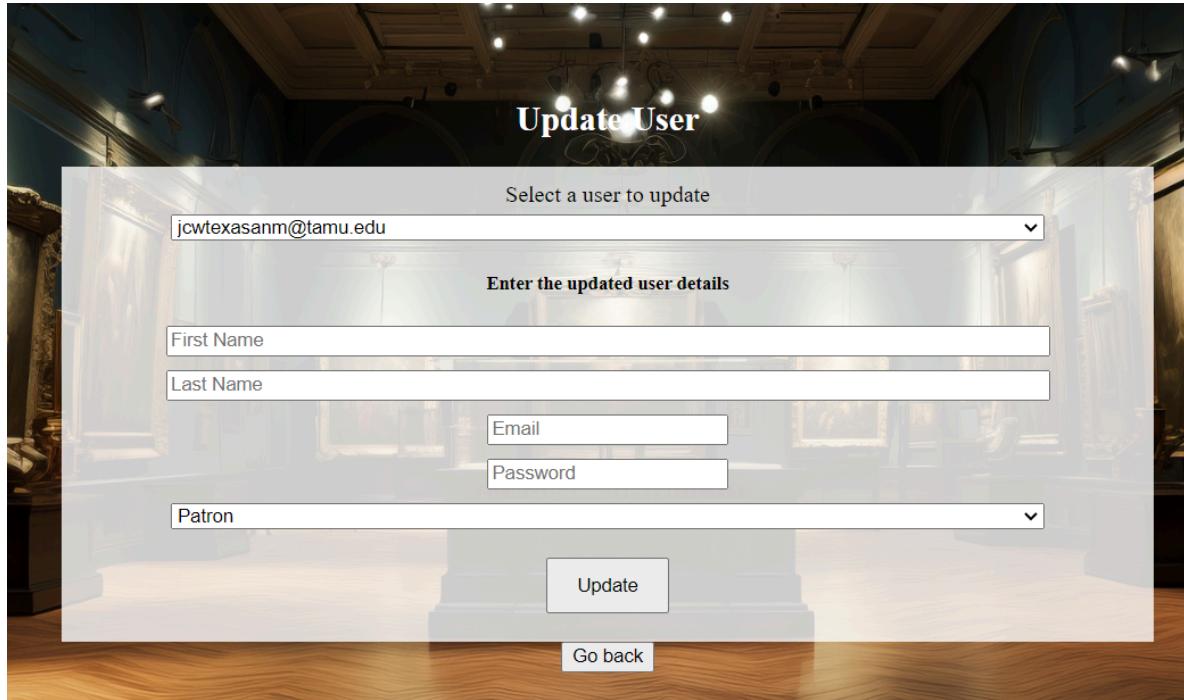


The screenshot shows a 'Users' table overlaid on a background image of a museum gallery. The table has a header row with columns: First Name, Last Name, Email, Password, and Role. Below the header are ten data rows. The 'Role' column indicates that most users are Admins (A), except for one Patron (P). The 'Email' column shows various test emails used for user creation.

First Name	Last Name	Email	Password	Role
Jaden	Wang	jewtexasanm@tamu.edu	password	A
Adam	Burhanpurwala	adam.burri@tamu.edu	password	A
test	user	testuser@gmail.com	password	P
Vedangi	Bengali	vedangi@bengali@tamu.edu	password	A
Pauline	Wade	paulinewade@tamu.edu	password	A
Kyle	Easton	kyleeaston@tamu.edu	password	A
test	user2	testuser2@gmail.com	password	P
newname	Easton	kaeaston1@yahoo.com	password	P
Blake	Dejohn	unknowingly@tamu.edu	password	A
The	Museum	arffolio@tamu.edu	password	A

- *Update User*

Select the user you want to update information for from the dropdown, then enter any new information about that user and click update. If successful, a green message will appear. Admins can update all users information, while patrons can update their own information.



Update User

Select a user to update

Enter the updated user details

First Name

Last Name

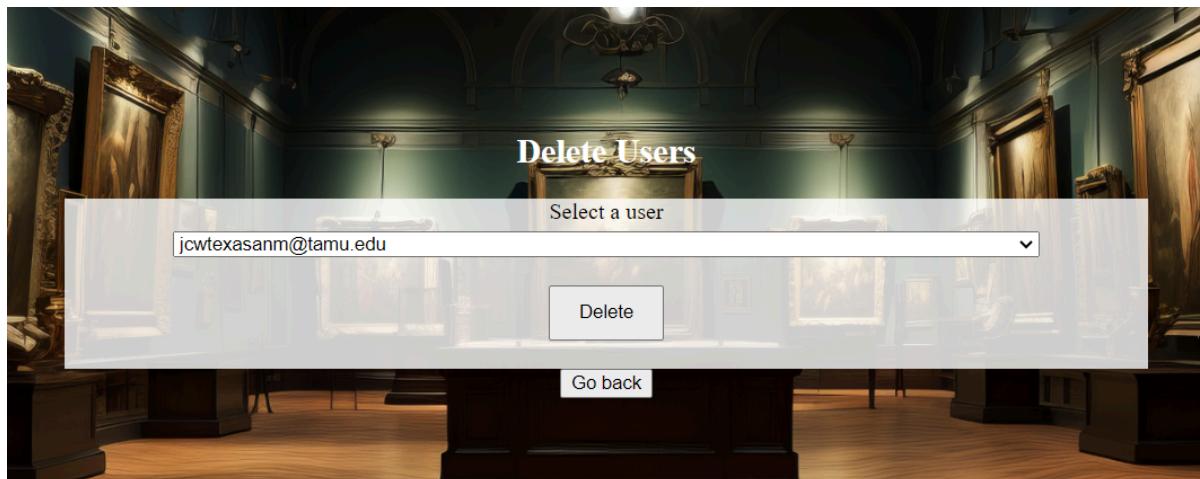
Email

Password

Patron

- *Delete Users*

Deleting users requires that the user not be referenced in any other database table. Click your user from the dropdown, then delete. If successful, a green message will appear. Admins can delete all users, while patrons can delete themselves.



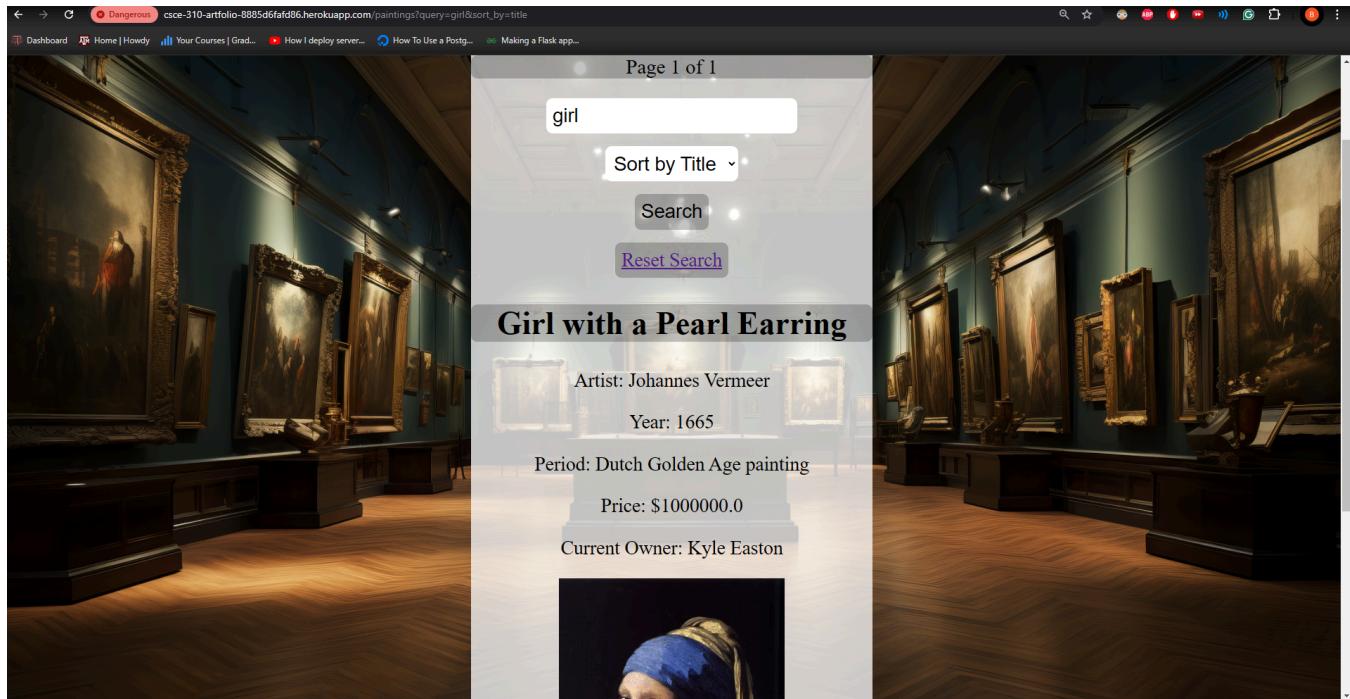
Delete Users

Select a user

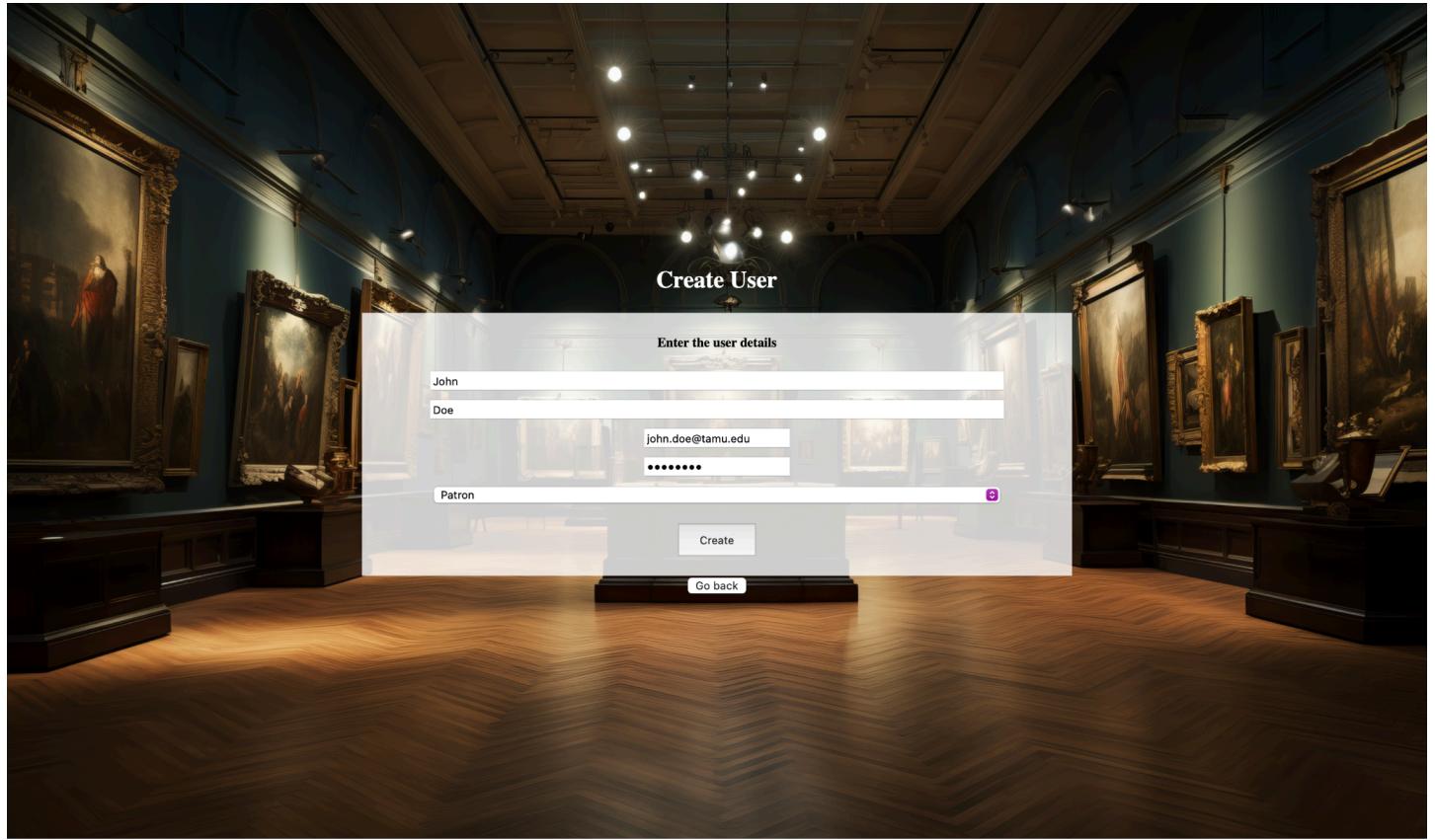
Sample Queries

The interface allows users to perform CRUD operations, which SQLAlchemy translates into efficient SQL statements executed by the backend. We dynamically generate views based on SQL queries coded in Python, ensuring accurate data retrieval and real-time updates. SQLAlchemy simplifies database interactions by abstracting complex queries and managing relationships, while ODBC drivers facilitate seamless connectivity to PostgreSQL.

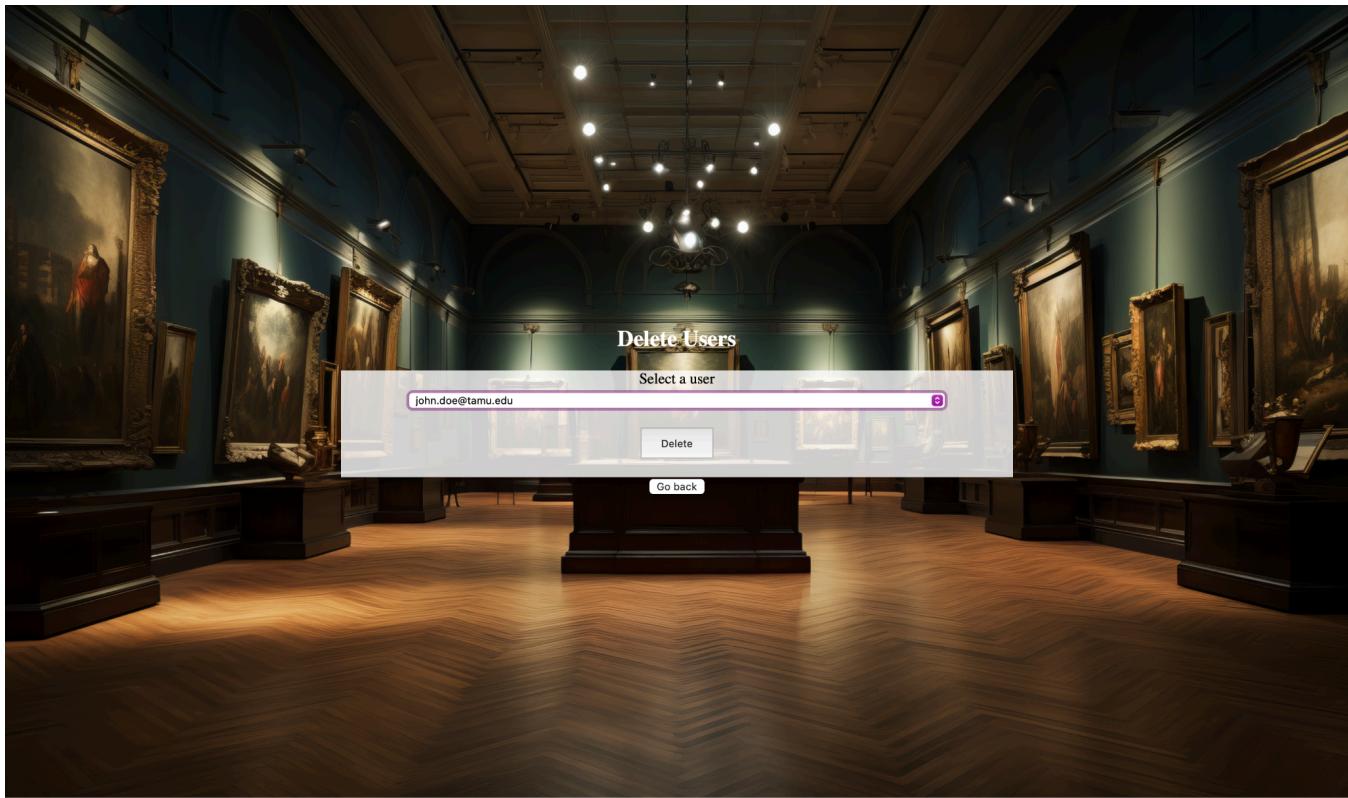
SELECT * FROM art_piece WHERE title ILIKE '%girl%';



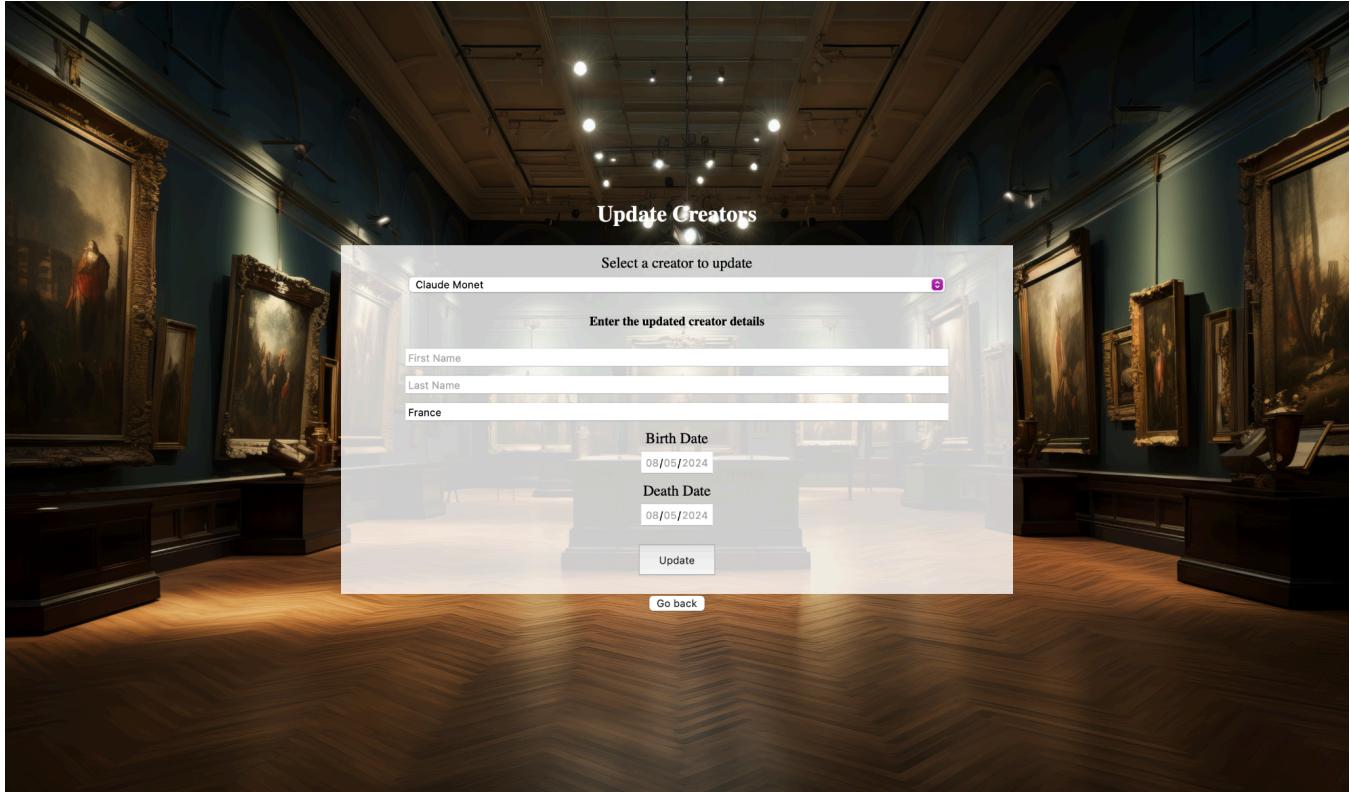
```
INSERT INTO users (user_fname, user_lname, email, password, role) VALUES(John, 'Doe',  
'john.doe@tamu.edu', 'password', 'P');
```



DELETE FROM users WHERE email = ‘john.doe@tamu.edu’;

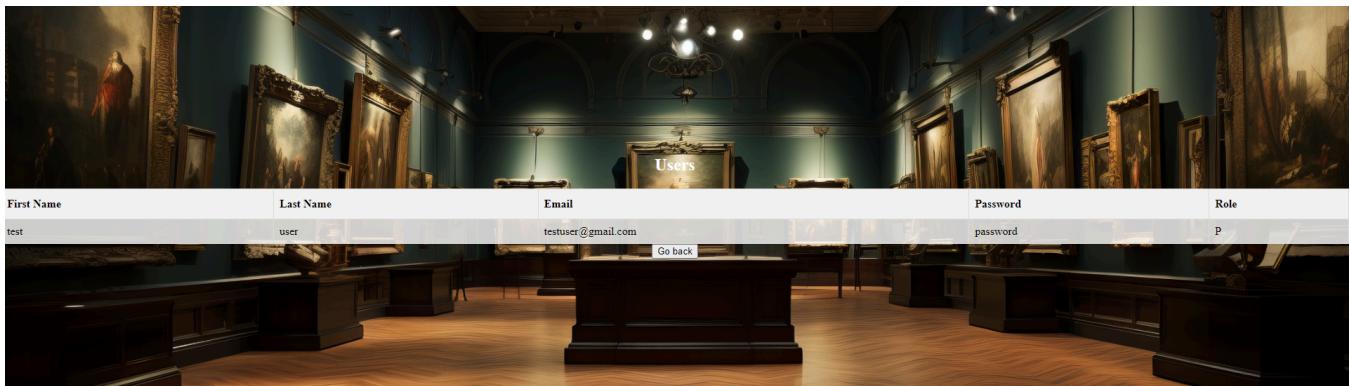


UPDATE creator SET Birth_Country = 'France' WHERE creator_id = 7;



SELECT * FROM USERS WHERE USER_ID=11

Patron Viewing users can only see their own account info



SELECT * FROM TRANSACTION

Admins are able to view all transactions in the database

Title	Buyer First Name	Buyer Last Name	Seller First Name	Seller Last Name	Timestamp
The Persistence of Memory	Kyle	Easton	Blake	Dejohn	2024-07-31 00:00:00
The Starry Night	Blake	Dejohn	The	Museum	2024-08-02 23:31:44.794866
The Persistence of Memory	test	user	Kyle	Easton	2024-08-03 23:25:52.226295
Breezing Up (A Fair Wind)	Blake	Dejohn	Blake	Dejohn	2024-08-04 22:46:00.112541
Breezing Up (A Fair Wind)	Blake	Dejohn	Blake	Dejohn	2024-07-30 14:05:10.367136
Destruction of Leviathan	Kyle	Easton	Blake	Dejohn	2024-07-30 22:44:27.353745
Mona Lisa	Kyle	Easton	The	Museum	2024-07-30 23:41:45.830893
Wanderer above the Sea of Fog	Kyle	Easton	The	Museum	2024-07-31 00:00:00
Girl with a Pearl Earring	Kyle	Easton	The	Museum	2024-08-01 00:26:26.027711
The Doctor	Jaden	Wang	The	Museum	2024-08-01 00:00:00
The Persistence of Memory	Kyle	Easton	Jaden	Wang	2024-08-01 00:00:00

[Go back](#)

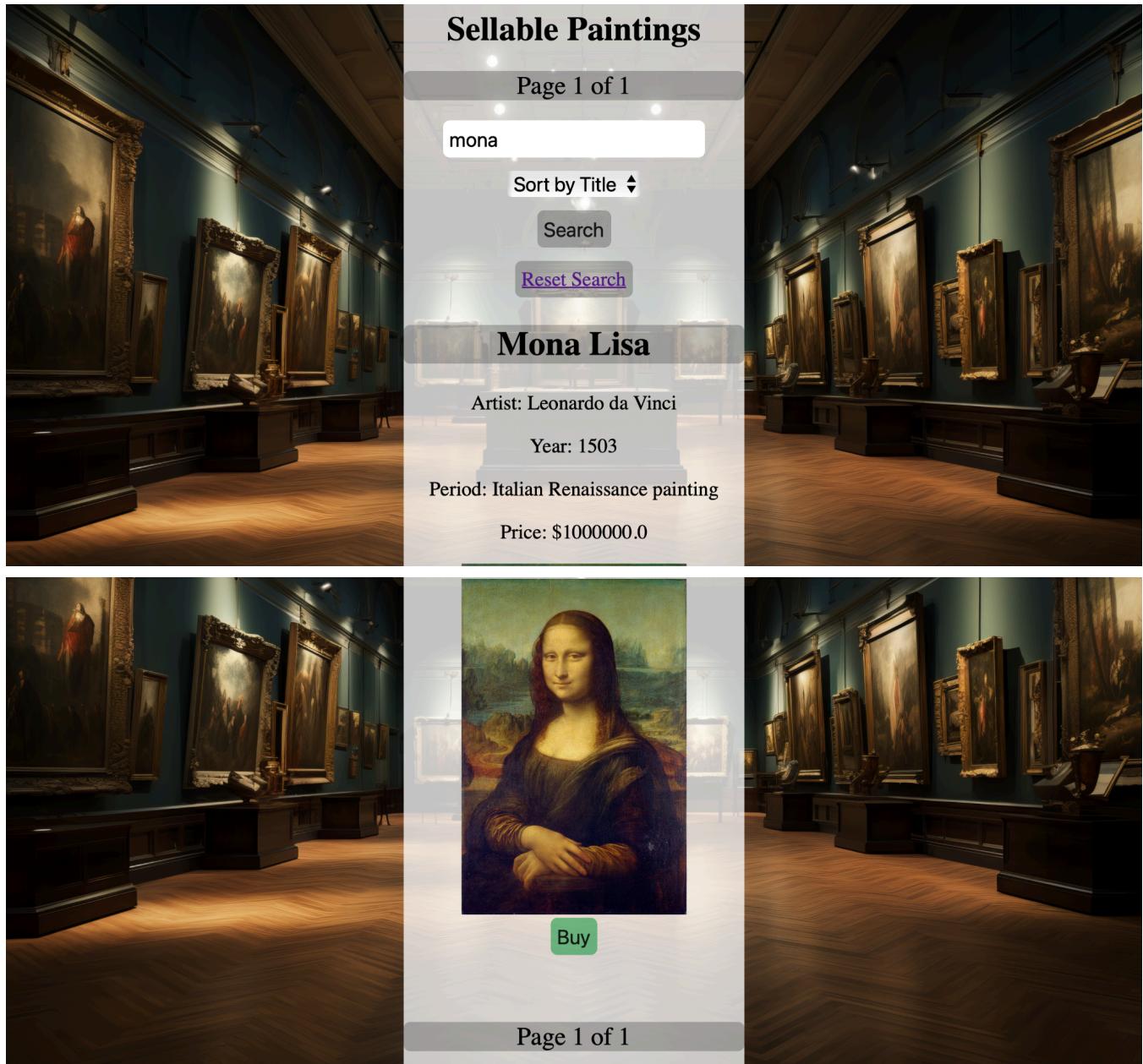
Buying a painting

BEGIN;

```
UPDATE art_piece SET sellable = FALSE, owner_id = 3 WHERE piece_id = 1;
```

```
INSERT INTO transaction (piece_id, buyer_id, seller_id, timestamp) VALUES (1, 2, 1, CURRENT_TIMESTAMP);
```

COMMIT;



Transactions

Title	Buyer First Name	Buyer Last Name	Seller First Name	Seller Last Name	Timestamp
The Persistence of Memory	Kyle	Easton	Blake	Dejohn	2024-07-31 00:00:00
The Starry Night	Blake	Dejohn	The	Museum	2024-08-02 23:31:44.794866
The Persistence of Memory	test	user	Kyle	Easton	2024-08-03 23:25:52.226295
Breezing Up (A Fair Wind)	Blake	Dejohn	Blake	Dejohn	2024-08-04 22:46:00.112541
Breezing Up (A Fair Wind)	Blake	Dejohn	Blake	Dejohn	2024-07-30 14:05:10.367136
Destruction of Leviathan	Kyle	Easton	Blake	Dejohn	2024-07-30 22:44:27.353745
Mona Lisa	Kyle	Easton	The	Museum	2024-07-30 23:41:45.830893
Wanderer above the Sea of Fog	Kyle	Easton	The	Museum	2024-07-31 00:00:00
Girl with a Pearl Earring	Kyle	Easton	The	Museum	2024-08-01 00:26:26.027711
The Doctor	Jaden	Wang	The	Museum	2024-08-01 00:00:00
The Persistence of Memory	Kyle	Easton	Jaden	Wang	2024-08-01 00:00:00

Go back

```
INSERT INTO creator (creator_id, creator_fname, creator_lname, birth_country, birth_date, death_date) VALUES (1, 'Alexandre', 'Cabanel', 'France', '1823-09-28', '1889-01-23');
```

```
INSERT INTO art_piece (piece_id, creator_id, owner_id, title, year_finished, cost, period, photo_link, sellable, viewable)
```

```
VALUES (15, 11, 1, 'The Fallen Angel', 1847, 1000000.00, 'Romantic Painting',  
https://upload.wikimedia.org/wikipedia/commons/f/f7/Alexandre\_Cabanel\_-\_Fallen\_Angel.jpg,  
TRUE, TRUE);
```

